

## WHAT IS CLAIMED IS:

1. An isolated nucleic acid comprising a sequence that is at least 85% identical to SEQ ID NO:1 or SEQ ID NO:3, or a sequence that is complementary thereto, or a sequence that due to the degeneracy of the genetic code encodes an identical polypeptide product.

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2. The nucleic acid of claim 1 comprising a sequence that is at least 90% identical to SEQ ID NO:1 or SEQ ID NO:3, or a sequence that is complementary thereto or a sequence that due to the degeneracy of the genetic code encodes an identical polypeptide product.

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3. The nucleic acid of claim 2 comprising a sequence that is at least 95% identical to SEQ ID NO:1 or SEQ ID NO:3, or a sequence that is complementary thereto or a sequence that due to the degeneracy of the genetic code encodes an identical polypeptide product.

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4. The nucleic acid of claim 3 comprising a sequence that is at least 99% identical to SEQ ID NO:1 or SEQ ID NO:3, or a sequence that is complementary thereto or a sequence that due to the degeneracy of the genetic code encodes an identical polypeptide product.

5. The nucleic acid of claim 4 comprising a sequence that is identical to SEQ ID NO:1 or SEQ ID NO:3, or a sequence that is complementary thereto or a sequence that due to the degeneracy of the genetic code encodes an identical polypeptide product..

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6. An isolated nucleic acid comprising a sequence that is at least 90% identical to a sequence of at least 50 contiguous nucleotides in a sequence selected from the group consisting of SEQ ID NO:1 and SEQ ID NO:3, or a sequence that is complementary thereto.

7. The isolated nucleic acid of claim 6 comprising a sequence that is at least 96% identical to a sequence of at least 50 contiguous nucleotides in a sequence selected from the group consisting of SEQ ID NO:1 and SEQ ID NO:3, or a sequence that is complementary thereto.

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8. The isolated nucleic acid of claim 7 comprising a sequence that is at least 98% identical to a sequence of at least 50 contiguous nucleotides in a sequence selected from the group consisting of SEQ ID NO:1 and SEQ ID NO:3, or a sequence that is complementary thereto.

9. The isolated nucleic acid of claim 8 comprising a sequence that is identical to a sequence of at least 50 contiguous nucleotides in a sequence selected from the group consisting of SEQ 30 ID NO:1 and SEQ ID NO:3, or a sequence that is complementary thereto.

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10. An isolated nucleic acid comprising a sequence that is at least 90% identical to a sequence of at least 100 contiguous nucleotides in a sequence selected from the group consisting of SEQ ID NO:1 and SEQ ID NO:3, or a sequence that is complementary thereto.

5 11. An isolated polypeptide comprising an amino acid sequence that is at least 60% similar to SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:5, SEQ ID NO:6 or SEQ ID NO:7.

12. The polypeptide of claim 11 comprising an amino acid sequence that is at least 70% similar to SEQ ID NO:2; SEQ ID NO:4, SEQ ID NO:5, SEQ ID NO:6 or SEQ ID NO:7.

13. The polypeptide of claim 12 comprising an amino acid sequence that is at least 80% similar to SEQ ID NO:2; SEQ ID NO:4, SEQ ID NO:5, SEQ ID NO:6 or SEQ ID NO:7.

10 14. The polypeptide of claim 13 comprising an amino acid sequence that is at least 90% similar to SEQ ID NO:2; SEQ ID NO:4, SEQ ID NO:5, SEQ ID NO:6 or SEQ ID NO:7.

15 15. The polypeptide of claim 14 comprising an amino acid sequence that is at least 95% similar to SEQ ID NO:2; SEQ ID NO:4, SEQ ID NO:5, SEQ ID NO:6 or SEQ ID NO:7.

16. The polypeptide of claim 15 comprising an amino acid sequence that is identical to SEQ ID NO:2; SEQ ID NO:4, SEQ ID NO:5, SEQ ID NO:6 or SEQ ID NO:7.

17. An isolated polypeptide comprising an amino acid sequence that is at least 90% identical to a sequence of at least 20 contiguous amino acid residues in a sequence selected from the group consisting of SEQ ID NO:2; SEQ ID NO:4, SEQ ID NO:5, SEQ ID NO:6 and SEQ ID NO:7.

20 18. The isolated polypeptide of claim 16 comprising a sequence that is identical to a sequence of at least 20 contiguous amino acid residues in a sequence selected from the group consisting of SEQ ID NO:2, SEQ ID NO:4 and SEQ ID NO:5.

19. A non-human mutant mammal having germ and/or somatic cells that carry at least one copy of an impaired HEPP gene.

25 20. The mammal of claim 18 that is heterozygous or homozygous for HEPP<sup>+</sup>.

21. The mammal of claim 18 that is a mouse.

22. The mammal of claim 18 that has least one functional impairment selected from the group consisting of perturbed hematopoiesis, reduced bone marrow cells, and impairment or progressive loss of motor function (paralysis).